

WE CLAIM:

1. A dependability measurement system comprising;

performance measurement means for measuring
performance parameters between a first location and a
5 second location in a communications network at sufficient
frequency to detect service-affecting failures and time-of-
occurrence;

service-affecting event computation means for
analyzing performance parameters measured by the
10 performance measurement means;

equipment event measurement means for monitoring
network elements of the communications network for the
occurrence of network element events;

population calculator means for determining
15 components within the communications network which are
related to dependability metrics to be reported upon and
calculating in-service time information for the components;

dependability metric calculator means for
calculating, analyzing and reporting dependability
20 parameters and dependability metrics using information
output from the service-affecting event computation means,
equipment event measurement means and population calculator
means; and

a user interface for supplying the dependability
25 measurement system with system parameters and control
information.

2. A dependability measurement system according to claim 1, wherein the performance measurement means comprises means for providing performance information request (PIR) signalling between the first location and the second location in the communications network.
3. A dependability measurement system according to claim 2, wherein the means for providing PIR signalling uses packets in measuring performance parameters.
4. A dependability measurement system according to claim 1, wherein the performance parameters to be measured provide a quantitative measure for determining transmission performance.
5. A dependability measurement system according to claim 1, wherein the performance parameters to be measured are at least one of packet delay, jitter, and integrity.
6. A dependability measurement system according to claim 1, wherein the performance measurement means further comprises means for storing measured performance parameters.
7. A dependability measurement system according to claim 6, wherein the means for storing measured performance parameters further comprises means for storing time and date information corresponding to at least one of the time of measurement of the measured performance parameters and the time of storage of the measured performance parameters.
8. A dependability measurement system according to claim 1, wherein the first location and the second location

define end points of a service path between first and second network elements.

9. A dependability measurement system according to claim 1, wherein the first location and the second location
5 define end points of a service path between an input and output of a single network element.

10. A dependability measurement system according to claim 1, wherein the service-affecting event computation means comprises means for analyzing measured performance
10 parameters to generate dependability parameter information.

11. A dependability measurement system according to claim 10, wherein the service-affecting event computation means further comprises means for storing dependability parameter information.

15 12. A dependability measurement system according to claim 1, wherein the service-affecting event computation means further comprises;

means for analyzing at least one measured performance parameter using temporal sliding window
20 analysis means to determine if the at least one measured performance parameter exceeds a user-specified dependability threshold;

means for determining for how long the at least one measured performance parameter exceeds a user-specified
25 dependability threshold; and

means for storing dependability parameter information resulting from analyzing the at least one measured performance parameter.

13. A dependability measurement system according to
5 claim 12, wherein the user-specified dependability threshold further comprises at least one of a failure threshold for applications and an outage threshold for service types.

14. A dependability measurement system according to
10 claim 1, wherein a network element event is a network element failure event.

15. A dependability measurement system according to claim 1, wherein the equipment event measurement means comprises;

15 means for monitoring a network element for an alarm generated in response to a network element event;

means for collecting user-specified information relating to the network element event; and

20 means for storing user-specified information relating to the network element event.

16. A dependability measurement system according to claim 1, wherein the dependability metric calculator means comprises information correlation means for correlating information from the service-affecting event computation
25 means and the equipment event measurement means.

17. A dependability measurement system according to claim 16, wherein the dependability metric calculator means further comprises means for calculating and storing dependability metrics based on information output from the information correlation means and the in-service time information from the population calculator means.

18. A dependability measurement system according to claim 1, wherein the dependability parameters are at least one of event start time, event end time, event duration, identification of the component experiencing an event, classification of type of the event, start of repair time, end of repair time, duration of repair time.

19. A dependability measurement system according to claim 1, wherein the dependability metrics are at least one of individual service outage downtime, individual service outage frequency, individual service failure rate, network element failure mode outage downtime, network element failure mode outage frequency, mean-time-to-restore service, intrinsic mean-time-to-repair, and total mean-time-to-repair.

20. A method for use in a dependability measurement system of a communications network comprising;

measuring performance parameters from a first location to a second location in a communications network;

analyzing measured performance parameters;

monitoring network elements of the communications network for the occurrence of network element events;

determining equipment within the communications network related to dependability metrics to be reported upon and calculating in-service time information for the equipment; and

5 calculating, analyzing and reporting dependability parameters and dependability metrics using information resulting from analyzing measured performance parameters, monitoring network element events and calculating the in-service time information for the
10 equipment related to dependability metrics to be reported upon.

21. A method according to claim 20, further comprising defining dependability measurement system parameters.

15 22. A method according to claim 21, wherein the dependability measurement system parameters are at least one of performance measurement parameters, dependability analysis parameters and dependability report parameters.

20 23. A method according to claim 20, wherein the measuring performance parameters step further comprises storing measured performance parameter results.

24. A method according to claim 20, wherein the measuring performance parameters step comprises performing PIR signalling between the first location and the second
25 location in the communications network.

25. A method according to claim 20, wherein the analyzing measured performance parameters step comprises

analyzing measured performance parameters to generate dependability parameters.

26. A method according to claim 20, wherein the analyzing measured performance parameters step further
5 comprises storing dependability parameters.

27. A method according to claim 20, wherein the analyzing measured performance parameters step further comprises;

analyzing at least one measured performance
10 parameter using temporal sliding window analysis means to determine if the at least one measured performance parameter exceeds a user-specified dependability threshold;

determining for how long the at least one
measured performance parameter exceeds a user-specified
15 dependability threshold; and

storing dependability parameter information
resulting from analyzing the at least one measured
performance parameter.

28. A method according to claim 20, wherein the
20 monitoring individual network elements step comprises;

monitoring a network element for an alarm
generated in response to a network element event;

collecting information relating to the network
element event; and

storing information relating to the network element event.

29. A communications network capable of operating a dependability measurement system, the communications
5 network comprising;

a plurality of network elements comprising performance measurement means, service-affecting event computation means and equipment event measurement means;

communication links established between the
10 plurality of network elements;

an operation service system comprising population calculator means and dependability metric calculator means, the operation service system having a memory storage device and an user interface; and

15 a communication link between the plurality of network elements and the operation service system.

30. A computer readable medium having computer readable program code means embodied therein for operating an operational service system of a dependability
20 measurement system, the computer readable code means comprising:

code means for interfacing with network elements that measure point-to-point performance parameters along a service path between at least two locations to determine an
25 occurrence of a network event and collect and store network event information;

code means for interfacing with network elements that monitor individual network elements for an occurrence of a network element event and collect and store network element event information;

5 code means for calculating dependability parameters based on network event information and network element event information;

code means for calculating dependability metrics based on measured network events and network element events
10 over a user-defined time period; and

code means reporting dependability parameters and dependability metrics.

31. A computer readable medium having computer readable program code means embodied therein for use in a
15 network element as part of a dependability measurement system, the computer readable code means comprising:

code means for measuring point-to-point performance parameters along a service path between at least two locations to determine an occurrence of a network
20 event;

code means for storing the measured point-to-point performance parameters;

code means for analyzing the measured point-to-point performance parameters and calculating dependability
25 parameters;

code means for storing the dependability parameters;

code means for monitoring the network element for an occurrence of a network element event;

5 code means for storing user-defined information regarding the network element event; and

code means for interfacing with an operational service system to supply dependability parameters based on network events and network element events.